

Commercial Fisheries Abstracts

a monthly summary of important developments
for the fishery industries

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Commercial Fisheries Abstracts



Prepared in the Branch of Commercial Fisheries

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Following is a brief outline of this filing system. The numbers apply to the first digit appearing on each card. For the meaning of subsequent digits, please see the above described leaflet.

- | | |
|---------------------------|----------------------|
| 0 General and theoretical | 5 Vitamins |
| 1 Fish by species | 6 Fishery byproducts |
| 2 Fresh fish | 7 Analytical Methods |
| 3 Preserved fish | 8 Composition |
| 4 Oils | 9 Miscellaneous |

Kenworthy, L.
Chemistry and

Chemistry and Industry, No. 22, 629 (May 29, 1954)

Machinery corrosion in naval vessels occurs in a variety of environments and is a constantly changing problem. Some of the more important current corrosion problems described by the author in relation to the type of system involved were as follows:

1. In seawater systems
 - a. Erosion in centrifugal pumps.
 - b. Cavitation attack of diesel engine cylinder liners.
2. In distilled water and steam systems
 - a. Corrosion and stress corrosion of 13% chromium iron turbine blading.
 - b. Selective attack of non-ferrous alloys in superheated and saturated steam.
3. In glycerine-water-oil hydraulic fluids
 - a. Corrosion of steel cylinder lines and bearings of pumps.
4. In forced lubrication systems
 - a. Pitting of main gear journals and thrust bearings where sea-water contamination had occurred.
5. In damp atmospheres
 - a. The attack of internal surfaces of empty boilers standing idle.
 - b. The attack of external surfaces of boilers during idle periods when hygroscopic deposits derived from the combustion of fuel oil were present.

COMMERCIAL FISHERIES ABSTRACTS VOL. VII NO. 8 PAGE 1
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: Martin Heerdt

3.5 SALTING AND DRYING OF STOCKFISH

Rosenbrock, W. and Rowan, A. N.
Fishing Industry Research Institute (South Africa), Sixth Annual Report of the Director, 11-12
(March 31, 1953)

Purity of Salt vs. Hygroscopicity

Preliminary tests showed that the rate of gain of moisture of salted and dried fish in an atmosphere of 80° F. and 65° F. relative humidity was faster when the salt used for salting the fish contained 1% MgCl₂, 0.65% CaSO₄ and 0.35% MgSO₄ than when pure salt was used, or salt containing only 1% MgCl₂ or only 1% CaCl₂. The first-named salt represents one which would only just pass the Institute's specification for salt intended for use in fish salting.

The rate of gain of moisture was also found to be greatly influenced by the surface area of the fish.

Brining of Stockfish

To investigate whether small fish for salting could be brought in by trawlers in salt instead of chilling in ice, headed and gutted stockfish were stored in bins with salt below and between the layers of fish, and the whole bin filled with saturated brine. Primes (3 1/2 lbs.) and pounders (1 1/2 lbs.) were stored for 4 days in the brine kept at 50° F. and at 60° F. In some bins the fish were taken out after 24 hours and salted and brined with fresh salt and brine; while in the others the brine and salt remained unchanged.

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COMMERCIAL FISHERIES ABSTRACTS VOL. VII NO. 8 PAGE 1
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE.

Reprinted in whole

CORROSION PROBLEMS

SALTING AND DRYING OF STOCKFISH

THE BACTERIOLOGY OF FRESH-WATER FISH

Venkataraman, R. and Sreenivasan, A.
Indian Journal of Medical Research 41, No. 4, 385-392 (October, 1953)

The most extensive work on the microflora of fresh-water fish has been done by the Norwegians, Thjotta and Somme. They isolated bacteria belonging to the following genera from fresh-water fish: Chromobacterium, Alcaligenes, Pseudomonas, Micrococcus, Sarcina, Streptococcus, Lactobacillus, Escherichia, Salmonella, Shigella, Achromobacter, Flavobacterium, Bacterium and Bacillus. The flora of fish from the Mettur Reservoir (India) were also found to exhibit a wide range of genera as contrasted with the surface water of the sea and with pelagic marine fish. With the exception of Chromobacterium, Streptococcus, Lactobacillus, Salmonella and Shigella, all of the other genera mentioned above were met with. In addition, a large number of Paracoloclostridium, one Microbacterium and one Kurtzia (Bact. zenkeri) were also found to be present.

Since the course of spoilage of fish depends on the bacterial flora, and the biochemical reactions of the bacteria indicate their "spoilage potential", the flora and biochemical types have been tabulated.

A high percentage of proteolytic groups were found to be present in the fish.

Aerobic, spore-forming rods belonging to the genus *Bacillus* were present in the slime of the catfish (*Silonia siluanda*) and in the carp *Labeo* but were altogether absent in the slime of the carp *Catla* as well as the flesh of *Cirrhina*, another carp. Evidently, the scaleless bottom-dwelling catfish and the bottom-feeding *Labeo* must have acquired these from the mud, where spore-formers can be expected. In contrast, the genus *Alcaligenes* was present in *Catla* and *Cirrhina* but not in the bottom-feeding fishes. Other differences in the flora of surface and bottom-feeding fishes were also noted.

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ABSTRACTER: Kathryn L. Osterhaug

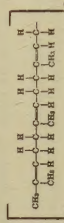
FASCINATING HYDROCARBON

Anonymous

Chemical and Engineering News 32, No. 19, 1923 (May 10, 1954)

The basking shark is so named because the non-pregnant female of the species likes to lie near the surface of the water and bask in the sunlight while exposing the tip of her nose, her dorsal fin, and the top of her tail. The basking shark is larger than any land animal and powerful enough to destroy a fisherman's net or boat with the flip of its tail. It sometimes attains a length of more than 30 feet and a weight of more than 4 1/2 tons, yet it is no more of a carnivore than the herring with which it shares a common diet of plankton.

The basking shark has a very large liver that holds a considerable quantity of oil. This oil, which is low in vitamin A, contains about 30 percent of an unusual hydrocarbon with the structure



and the name squalene.

A colorless, high-boiling-point fraction of molecularly-distilled basking-shark liver oil that contains 90-95 percent squalene is presently available for investigational use only.

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COMMERCIAL FISHERIES ABSTRACTS VOL. VII NO. 8 PAGE 1
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ABSTRACTER: Martin Heerdt

BACTERIOLOGY OF INDIAN FISH

SQUALENE IN THE BASKING SHARK

3. 5

In the fish stored at 50° F. the small fish were still in good condition after 4 days; but the primes showed slight souring along the backbone. At 60° F. the small fish were slightly sour and the primes were "off". The changing of the brine after 24 hours made no difference to the final quality of the fish, either just after brining or after drying under commercial conditions. The lowering of the temperature of the brine definitely improved the quality of the fish.

It appears therefore that pounders can definitely be held in brine at temperatures below 50° F. for up to 4 days and this method would be satisfactory for holding small fish in the holds of trawlers instead of chilling them in ice as at present.

Injection of Brine into Large Stockfish

Large stockfish (approximately 8 lbs. weight) were injected with saturated brine all along the sides and back using a hypodermic syringe. In all 35 injections of 10 ccs. each were made. The fish were salted down with alternate layers of fish and salt and covered with saturated brine. Untreated fish were similarly salted down. After 4 days in this brine at approximately 65° F. no difference in quality of the two groups of fish could be detected, both lots being "off" especially along the backbone. The flesh of the injected fish appeared to be slightly waterlogged and softer than the controls.

0. 31

There appears to be no explanation as to why the basking shark and the cacao shark of East African waters accumulate so much squalene in their livers. More surprisingly, squalene is present in olive oil but not in other vegetable oils, is a precursor of cholesterol, and is a normal component of human sebum.

0. 5 (Cross References: 2.01, 1. 92)

Ninety-five strains of bacteria were isolated from the fresh-water fish, *Cirrhitina cirrhosa*, *Catla catla*, *Silonia silundia* and *Labeo fimbriatus*. The organisms belonged to a wide range of genera, which, in the order of numerical importance are: Micrococcus, Flavobacterium, Paraclostridium, Achromobacter, Bacterium, Alcaligenes, Pseudomonas, Bacillus, Sarcina, Aerobacter and Microbacterium.

TABLE III.
Showing the biochemical properties of the bacteria from fresh-water fish.

Properties.	Lacto alime.	Silicic alime.	Glycine fresh.	Catla alime.	Silicic acid wall.	Total number of strains, 95.
Gelatin liquefiers	18	7	13	22	8	62
Indole producers	2	...	5	5	...	12
Nitrate reducers	8	6	16	20	3	53
Milk peptonizers	10	4	5	10	...	29
Chromogenic	7	4	9	17	7	44
H ₂ S producers	NH	NH	NH	NH	NH	NH

Piskur, M. M.

Journal of the American Oil Chemists' Society 31, No. 5, 176-191 (May, 1954)

General articles which contain some economic information are written on: sea animal oil of Hokkaido (Ueno-Pette u. Seifen 55, 685), sources and properties of fish fats (Lovern--Ibid. 425); source and vitamin A content of various fish oils of Russia (Symposium, most work directed by Bukin--Akad. Nauk S.S.S.R., Inst. Biokhim. im. A. N. Bakha Vitaminye Res. 1 Ispol'zovanie Sbornik 1, 7, 11, 113, 158, 182, 216, 222, 250, 278).

A Norwegian technical research committee (Norsk Hvalfanst Tid. 41, 289) has reported experimental data on processing whales. They designed processes utilizing conical centrifuges which have greater capacity so as to approach the efficiency of separation of fat, grax, and low-sludge glue water by the cylindrical centrifuge processes. A new process designed for fish, but applicable to other fatty materials, comprises electrolyzing ground material in salt solution, filtering, and centrifuging out the fat (Bruzac--Fr. 885, 512). In two new processes for converting fish waste and animal carcasses to fertilizer and grease, digestions by acetic acid (Alimentation Equilibree--Fr. 979, 036) and hydrochloric acid (Salonaise Chem. Products Co. --Fr. 881, 923) are used to release the fat.

A comparison of five methods of production of vitamin A concentrates from fish livers by Martin-Perez (Ion 13, 61) indicated that digestion of livers with 30% by weight of solid potassium hydroxide, addition of two parts of flour, and extraction with trichloroethylene at 40° gave the highest potency product with 99-100% recovery. An oil-solvent extraction comprises adding two parts of edible oil per each part of liver, vacuum drying, and separating dehydrated solids from the oil

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Reprinted in part

Black, W. A. P. and Dewar, E. T.

Journal of the Science of Food and Agriculture 5, No. 4, 176-183 (April, 1954)

The authors found that the cold-water-insoluble form of laminarin obtained from *Laminaria cloustoni* could not be rendered soluble by modifying the terminal reducing groups at the end of the chains, either by oxidation with hypodite or hypochlorite or by reduction with sodium borohydride. Insoluble laminarin was rendered soluble, however, by the preparation of various ethers of laminarin, the aqueous solutions of which showed no sign of precipitation at room temperature over a period of several weeks. Hydroxyethyl- and hydroxypropyl-laminarin were obtained in 88.3 percent and 75.9 percent yields by treating an alkaline solution of laminarin with ethylene and propylene oxides, respectively. Both of these derivatives are ash-free like laminarin with specific rotations similar to that of laminarin. Since these derivatives are ethers, they should be as stable to acids and alkalis as laminarin itself. Sodium carboxymethyl-laminarin with almost one carboxymethyl group per unit of glucose was prepared in 94.7 percent yield. Aqueous solutions of sodium carboxymethyl-laminarin are stable at room temperature, but they yield insoluble copper, silver, lead, and aluminum salts. A water-soluble benzyl ether containing 0.5 benzyl groups per glucose unit was also prepared.

Esters of insoluble laminarin, most of which were water-insoluble, were included among the derivatives prepared. By treating the freshly precipitated laminarin with acetic anhydride and pyridine in the cold for 2 days, triacetyl-laminarin $[\alpha]_D^{25} -63.6^\circ$ in chloroform was obtained in 88.3 percent yield. When laminarin was dispersed in pyridine according to the method of Pascu & Mullen, an acetate with a lower acetyl content $[\alpha]_D^{25} -1.0^\circ$ in chloroform was obtained. The tri-benzoyl ester of laminarin was obtained in 81.2 percent yield by holding a mixture of laminarin

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UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: Martin Heerdt

Walker, F. T. (Institute of Seaweed Research, Musselburgh, Midlothian, Scotland)
Nature 173, No. 4408, 766-68 (April 24, 1954)

The marine coastline of Scotland, including the islands of Skye and Orkney, is 5,300 miles in length, the sub-littoral zone from low water mark to a depth of ten fathoms is two million acres; over this area, with considerable variation in seaweed density, grows 10 million tons (fresh weight) of Laminariaceae. Of this quantity, 3 to 4 million tons are concentrated in quantities of economic value.

Fifty-nine detailed surveys, covering 80,000 acres of sub-littoral zone off the north-east, south-east and south-west mainland of Scotland, the Isle of Skye and the islands of Orkney have been completed by the Botanical Division of the Institute of Seaweed Research.

Preceded by aerial photogrammetric surveys, the detailed surveys were carried out during the different seasons of the year over a seven-year period (1946-53). They therefore cover seasonal and cyclical changes. The surveys covered areas of the sea bed from low-water mark down to ten fathoms where the dominant species was either *Laminaria cloustoni*, *L. digitata* or *L. saccharina*.

In the course of the surveys operated from motor vessels some 50,000 quadrats were taken from the sea bed by means of calibrated spring-grabs which close by trigger action on reaching bottom.

The 1946-49 surveys employed methods of quadrat sampling along transects measured by range-finder, while for the 1949-53 surveys, random sampling was used.

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ABSTRACTER: Kathryn L. Osterhaug

Hauptvogel, Heinrich

Canadian Fisheries Annual, 62-65 (1954)

In the manufacture of a feeding meal, all the constituents of fish and fish offal that may be of value and that may be affected by processing techniques have to be considered.

The water content of the finished material must not be larger than the corresponding atmospheric moisture content which, in most countries, is around 10 percent. The presence of larger quantities of water will bring about decomposition and reduce storage life.

It is essential that the proteins of fish and fish offal be retained as much as possible in the finished product, and also that they remain completely digestible. High process temperatures affect the digestibility of the meal and must be avoided. The protein content may be about 60 to 75 percent in the finished material. The digestibility may be about 90 to 95 percent.

The oil content of fish meal should be kept within 3 to 5 percent. A higher oil content can be harmful and can make the meal unsuitable for feeding purposes.

Phosphoric-acid-lime is used to the greatest advantage in the feeding of young animals because of its bone-growth-promoting properties. In a good, properly processed fish meal, its content may be about 12 to 18 percent.

Salt in small quantities stimulates the appetite, but it should not be used in excess of 2 to 4 percent in fish meal. The animal fed a meal containing too much salt will require excessive quantities

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ABSTRACTER: Roy C. Stevens

6. 3 benzoyl chloride and pyridine for 8 days at room temperature. Laminarin tricarbamilate was obtained in quantitative yield by holding a mixture of laminarin, phenyl isocyanate and pyridine for 7 1/2 hours at 100°. Laminarin triacetate, tribenzoate, and tricarbamilate are soluble in a wide range of organic solvents but not in water. A series of laminarin sulfates containing from 2.15 to 0.20 sulfate groups per glucose unit were prepared by using chlorosulfonic acid and pyridine. Six percent aqueous solutions of those laminarins that contained 2.15 and 1.37 sulfate groups per glucose unit showed no sign of precipitation on being held for 32 days. Since it is possible that laminarin sulfate may possess anticoagulant properties similar to those of dextran sulfate and other sulfated polysaccharides, these esters are being tested for heparin activity.	6. 130 of water, thus reducing its capacity for nutritive foods. Important vitamins and trace minerals are contained in fish and fish offal. To retain these in fish meal it is essential that all factors that might destroy them, especially high temperature, be avoided in treating the fish material. Various methods of wet- and dry-processing are described by the author. He also discusses at some length the economic aspect of fish meal plant operation.
6. 133 (Cross Reference: 6. 23) (Greenfield--U. S. 2, 651, 647). Vitamin A was concentrated from fish liver oil by selective extraction with furfural and washing the crude extract with 80% methanol (Abe--J. Chem. Soc. Japan, Ind. Chem. Sect. 54, 229).	

Martin, W. R. and McCracken, F. D.
Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations, No. 58,
17-20 (April, 1954)

Information on the relative merits of substitute baits for the capture of groundfish on long lines is of considerable value to fishermen.

During July 8 to September 9, 1949, 7 baits were compared at Souris, Prince Edward Island (P. E. I.). Throughout the experiments, 36 lines of trawl (a total of 1,620 hooks) were set each fishing day, with the baits tested on alternate lines. Three experiments were carried out as follows:
(1) 10 night sets to compare 6 baits, 3 at a time; (2) 5 flying sets to compare 4 baits each day;
(3) 4 flying sets to compare 4 baits each day. The average daily catch by species for each experiment is shown in Table I.

Table I. Average catch in pounds by nine lines of baited trawl at Souris, P. E. I.

Bait	Hake			Cod			Haddock		
	Exp. I	Exp. II	Exp. III	Exp. I	Exp. II	Exp. III	Exp. I	Exp. II	Exp. III
Frozen squid	-	-	367	-	-	3	-	-	26
Frozen mackerel	443	262	312	41	6	7	21	20	40
Frozen herring	315	179	211	23	8	3	12	8	14
Frozen flounders	191	152	-	11	3	-	2	2	-
Clams	152	-	-	44	-	-	9	-	-
Shack (hake)	122	37	98	8	0	0	0	2	3
Salt herring	106	-	-	7	-	-	2	-	-

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UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: Martin Heerd

3. 5 SALTING AND DRYING OF STOCKFISH

Willmer, J. S. and Rosenbrock, W.
Fishing Industry Research Institute (South Africa), Sixth Annual Report of the Director, 12
(March 31, 1953)

Preservatives

(a) Malonic acid. Based upon the supposition that autolytic changes in fish flesh might involve the tricarboxylic acid cycle, an attempt to reduce autolysis was made by inhibiting the cycle. Malonic acid which inhibits the succinic dehydrogenase system, was selected for this purpose as being relatively non-toxic, by comparison with other inhibitors of the cycle.

When added to brine for salting, malonic acid at concentrations of 0.5% and 0.1% prevented softening of the flesh of stockfish to a considerable extent, no soft fish being present when the acid was used at the higher level, and only one soft fish in a batch of 12 immersed in brine containing 0.1% malonic acid. This compared with 5 soft fish among the controls. Similar figures were found when the method was repeated. At the present price of pure malonic acid (retail) the additional cost of brining would be approximately £ 9 10s. 0d. for 5 tons of fish using the inhibitor at a concentration of 0.1% (w/v). This increase could probably be reduced by using a cruder preparation of the acid.

Toxicity studies were very kindly performed by Dr. N. Sapeika of the Department of Pharmacology of the University of Cape Town.

Albino rats of Wistar strain were fed ad libitum a modified Thomson diet containing malonic acid at levels of 0.2% and 0.5%. At the former level groups of rats were fed for 13, 40 and 30 days respectively without significant mortality, or clinical symptoms. During these periods the rats

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Reprinted in whole

EFFECTIVENESS OF VARIOUS BAITS

DRYING AND SALTING OF STOCKFISH

Anonymous
Pacific Fisherman 52, No. 6, 25 (June, 1954)

A lampara-type net, developed originally for anchovies, has been used successfully for tuna by vessels fishing out of Port Hueneme, California. The advantages of this gear, according to the inventor, are a smaller crew, a lighter net, and the opportunity of making many more sets during a 24-hour period than with a larger purse seine net.

The new net is said to depend primarily upon its hanging, which in turn provides a tension in the wings. When the net is closed, the mesh itself closes, trapping the fish with a bag effect. Wind and currents must be considered in making sets, and much practice is required in order to operate the net successfully.

The seine is hauled mechanically over twin gurdies, one for each wing. Cotton, nylon, and linen were used in the construction of the tuna net. The number of floats used on the net is said to be a factor in controlling the tonnage-take.

Using a spotting plane with two-way radiotelephone, a vessel fishing the new net has completed a set on a school of tuna in 35 minutes. This would permit, when the fish are schooling, from three to seven sets a day.

A stern roller is used with this gear, consisting of a horizontal roller and two vertical rollers. This may be removed when not in use.

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UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: Roy C. Stevens

Empey, W. A. (C. S. I. R. O. Division of Food Preservation)
Fisheries Newsletter (Australia) 13, No. 3, 15-17 (March, 1954)

Approximately 600,000 metric tons of oysters in the shell are produced in the United States each year. This amounts to about 70 percent of the total world catch. The yield of shucked meats is of the order of 40,000 metric tons. Of the total production, approximately 87 percent is obtained from the Eastern oyster (*Ostrea virginica*), 9 percent from the Pacific oyster (*Ostrea gigas*), and 4 percent from the Olympia oyster (*Ostrea lurida*).

Most oysters are marketed in the fresh shucked condition, and less than 10 percent are sold in the shell. Approximately 10 percent of the shucked meats are canned, and the production of frozen oysters is rapidly increasing.

On arrival at the plant, the oysters are unloaded by bucket hoists or conveyors. In some plants the unloaded oysters are sprayed with water from hoses, and in a few, they are washed in mechanical washers. When the oysters are to be canned, washing is sometimes omitted since the preliminary steaming process removes the mud and debris from the shells. In the case of oysters to be marketed in the fresh shucked condition, some plants have large concrete tanks in which the oysters are held in running sea water for about 24 hours. The tanks, which are about 3 feet deep, have false bottoms with grids to remove debris and materials discharged by the oysters. Sterilization is accomplished by means of a constant supply of chlorine gas supplied to the water.

Oysters that are to be marketed fresh or frozen are opened by hand, using special shucking knives to cut the large muscles that attach the body to the shell. Only a few mechanical shucking machines are in use. After the removal of discolored meats, shell fragments, and other debris, the meats are

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UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: Roy C. Stevens

LAMPARA-TYPE TUNA NET

OYSTER PROCESSING

3.5 (Cross References: 3.12, 3.7)

continued to gain in weight normally, and at autopsy neither macroscopic nor histological changes were observed. Rats fed on the diet containing 0.5% malonic acid for 13 days showed neither mortality, clinical symptoms nor changes at post mortem examination.

When groups of rats were given single doses of malonic acid by stomach tube of (a) 0.5 g. each; (b) 0.25 g. each, and (c) 0.125 g. each, it was found that all rats of group (a) died within one hour; 50% of the rats of group (b) died within 3 1/2 days, the remainder surviving until destroyed 30 days after administering the acid; and all rats of group (c) survived until destroyed.

Dose rate (c) corresponds approximately to a single dose of 37.5 g. malonic acid for a human subject. It seems reasonable to assume therefore that at the level used in fish brine no danger of mortality or histological changes exists.

(b) Hydrochloric acid. Fact-finding experiments which were not thoroughly conclusive indicated that the addition of hydrochloric acid to the brine at concentrations greater than 1.2% did assist in the preservation of the fish. However, even at 1.2% concentration a certain amount of protein coagulation and denaturation was noticeable; above 1.8% hydrochloric acid the flesh smelled strongly of the acid.

Drying without Salting

Attempts to dry split stockfish weighing between 4 lbs. and 5 lbs. showed that provided that the fish was cut into strips no wider than 1 1/2", it could be dried satisfactorily in an airstream at 80° F. Drying to 15% moisture content took about 3 days.

2.1127

During the summer of 1950, 7 baits were compared at Ricibucto, New Brunswick (N.B.), and at Tignish, P.E.I. Five frozen baits (squid, mackerel, spring Gulf herring, Nova Scotia (N.S.) herring, and N.S. flounders) and 2 fresh baits (clams, shack--waste fish caught during fishing--), were alternated by lines. Approximately 2,700 hooks on 54 lines using 3 or 4 baits were fished in both night sets and flying sets. Mackerel caught one and a half times as much as Gulf herring. Clams, shack and flounders caught much less than either Gulf herring or mackerel. Not enough N.S. herring was used to give definite results. Table II (omitted) shows that squid, N.S. herring, mackerel, and Gulf herring caught, respectively, an average of 11.9, 3.7, 2.8, and 2.2 pounds of cod per pound of bait used at Tignish, P.E.I.

During the period January 23 to May 18, 1953, bait experiments were carried out at Lockeport, N.S. Five frozen baits (N.S. herring, Gulf spring herring, Gulf summer fat herring, mackerel from Cape Breton, and squid from New Brunswick (N.B.)) were compared. Six 9-line tubs and 3 baits were fished in each set using the standard bait, N.S. herring. The bait was changed every 3 lines; the order of baits was changed for each set; and the 2 series of baits were fished on alternate fishing days. Fishing weather was poor and only 18 sets were made, 13 being on inshore fishing grounds. Table III shows the relative efficacy of baits for cod and haddock on the inshore sets. Squid lasted better on hooks than mackerel, and mackerel better than herring.

Bait	Number of sets	Pounds of bait per line		Pounds caught per pound of bait		Average size in pounds	
		Cod	Haddock	Cod	Haddock	Cod	Haddock
Squid.....	6	3.4	4.0	2.5	6.5	7.1	2.7
Mackerel.....	6	3.3	2.4	2.7	5.1	5.2	2.4
N.S. herring.....	6	3.3	3.0	2.2	5.2	4.2	2.7
Spring herring.....	7	3.2	2.2	1.5	3.7	4.8	3.1
Fall herring.....	7	3.3	2.4	1.8	4.2	5.0	2.8
N.S. herring.....	7	3.3	3.4	1.8	5.2	4.6	2.7
Squid poor quality, small.....	1	2.5	1.4	0.7	2.1	2.5	2.9
Squid large.....	1	3.4	1.4	1.1	2.5	3.7	2.9
Squid good quality, large.....	4	3.5	4.3	3.1	7.4	7.3	2.6

1.81 (Cross References: 3.23, 3.33)

washed and then transferred to a blowing tank. Forced air enters the tank through perforated pipes, agitating the water and meat, thus increasing the efficiency of washing and improving the appearance of the meats. After blowing, the oysters are drained on skimming tables, machine graded to size, and packed in containers of varying capacity from one pint to five gallons.

Oyster meats to be frozen, after washing and grading, are usually packed in 12-ounce rectangular waxed cartons, lined with moisture-vapor-proof paper, and finally wrapped in waxed glassine paper and heat sealed. After freezing, the cartons are packed in corrugated fibreboard shipping containers and held at 0° F. while awaiting transport.

Oysters to be canned are given a pre-steaming to open the shells and facilitate removal of the meat. After they have been shucked and washed, the meats are filled into cans and hot water and salt or hot salt brine is added. Fill-in weights vary according to the pre-steaming time and temperature. On the East Coast, where longer times at higher temperatures are used, a shrinkage occurs that results in a subsequent gain in weight during retorting in cans containing added liquid, and during storage. Accordingly, a fill-in weight of approximately only 90 percent of the desired drained weight is required. On the West Coast, where oysters are opened in comparatively short times at lower temperatures, a further shrinkage takes place during retorting in the can that makes it necessary to use fill-in weights that are 25 percent to 50 percent higher than the required drained weights.

Processes commonly used for the Atlantic oyster pack in cans of various commercial sizes are 17 to 18 minutes at 240° F. or 8 to 9 minutes at 250° F. The latter is preferred. The retorting times are appreciably longer for the Pacific Coast pack, and range from 20 minutes at 240° F. for the smaller cans, up to 42 minutes at 240° F. for the larger cans (No. 2).

The yield of canned oyster meats is approximately 7 percent of the original weight of the oysters in the shell. Other canned packs include smoked oysters, soups, and stews.

2.1125 (Cross Reference: 1.1)

3.19 RADIATION STERILIZATION OF FOODS

Pratt, G. B. and Eklund, O. F.
Quick Frozen Foods 16, No. 10, 50-51, 138-139 (May, 1954)

Studies were conducted with regard to the factors affecting the radiation sterilization requirements of food. Among those factors were the type and concentration of the contaminating organisms, the nature of the medium in which the organisms are contained, and the presence of air.

The pH of the medium containing the organisms was found to have little effect. In contrast to conventional heat sterilization where spores are more readily destroyed in acid solutions, it appeared that the point of least resistance, at least for the spore-forming *Bacillus stearothermophilus*, is somewhere near the neutral point.

Samples of meat that had been subject to sterilization dosages of gamma radiation were found by many tasters to have objectionable taste characteristics. The presence of sodium ascorbate as a free radical acceptor was found to have little or no effect in preventing color and flavor changes. Irradiation of the meat while frozen and, to a lesser extent, the addition of sodium ascorbate were found to reduce the objectionable flavor in beef, but not in pork. Pasteurization after irradiation seemed to have no effect on the flavor after storage.

The off-flavors developed during radiation continue to present an obstacle to the commercial application of this method of sterilization.

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ABSTRACTER: Roy C. Stevens

2.19 "BILGY" FISH

Castell, C. H.
Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations, No. 58, 27-31 (April, 1954)

Bilgy fish may be characterized as follows: (1) an indescribably vile odor is present, (2) the odor diminishes on the surface of fillets that are exposed to air, (3) the odor can develop in fish without a rise in pH or an accumulation of trimethylamine, (4) the odor is intensified by the addition of acids, (5) sulfuric acid causes a suspension of bilgy fish to froth, indicating the release of volatile acids, and (6) the relationships between acidity and bad odors found in the fish are the same as are found in bilge water.

Does bilge water cause bilgy fish? No. Bilgy fish usually occur at or near the bottom of the pen, but typical samples have been found elsewhere. If bilge water was purposely poured over fish which had been stored in ice and at room temperature, the odor disappeared in less than 24 hours. Typical bilgy fish have been produced in pens at the Fisheries Station where there is no bilge water. Aboard the boat bilgy fish are most common among the oldest part of the catch. This indicates the growth or an increase of something rather than a simple splashing with drainage water. There is no direct evidence to show that trawler bilge water does splash upon the fish; there is much to suggest that rarely, if ever, occurs.

The first thing that we must learn about bilgy fish is that, like the odor from the cesspool, it only develops in the absence of air. The absence of air alone will not make fish go bilgy. The correct type of spoilage bacteria must also be present. Unfortunately most fish contain an abundant source of these bacteria. Most of the bilgy fish occur in the lowest level of the pens where the oldest fish are

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ABSTRACTER: Martin Heerd

RADIATION STERILIZATION

PREVENTION OF "BILGY" FISH

3.5 SALTING AND DRYING OF STOCKFISH

Lewis, A. M.; Rowan, A. N.; and Williams, D. T.
Fishing Industry Research Institute (South Africa), Sixth Annual Report of the Director, 12-13 (March 31, 1953)

Tunnel Drying of Salted Fish

Tests were conducted to determine the drying rate of salted stockfish in a tunnel with an air velocity of 400 ft./min. Thirty-two salted fish (varying in weight from 10 oz. to 31 oz.) were selected from fish ready for drying industrially and placed on eight tenters at approximately 6" centres. The total weight of fish was 35 lbs. 12 oz. and the hanging density in the small laboratory unit was 4.1 lbs./cubic ft.

The test was carried out during the summer (February)--the weather conditions at the time, however, were not typical of the Cape summer inasmuch as the relative humidity was abnormally high; the worst condition during the test being 79° F. (dry bulb) and 66% R. H. This air had to be heated to 84° F. to give an inlet R. H. of 56%. (The desired inlet condition is dry bulb not higher than 80° F. and R. H. between 40% and 45%). Over the 4 days drying period the average air inlet temperature was 83° F., and R. H. 48%. The average air outlet temperature was 81° F., and R. H. 54%.

The total loss of weight of the 32 fish was 12 lbs. 12 1/4 oz. in 4 days, and assuming (from determinations of 6 random samples) that the average initial moisture content was 52%, the average final moisture content was 25.4% after 4 days.

The weights of six fish selected at random were checked at frequent intervals during the test and curves were obtained of the rate of drying of these fish over the 4 day test period.

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Reprinted in whole

2.14 "MATTANZA" -- A UNIQUE FISHING METHOD

Bradford, Ernle
World Fishing 3, No. 5, 164-166 (May, 1954)

A unique method of fishing for tuna is employed in the Mediterranean. In Sicily, where it was observed by the author, the method is known as a "mattanza."

The technique is based on two facts known about the tuna's habits: (1) In the spring and early summer the tuna comes in close to the shore to spawn. (2) The tuna has a left-handed sense of direction -- that is, when confronted with a net, he will always attempt to go around it to the left, and never to the right.

A series of square, box-like nets are laid out from the coast at various points where it is known that the tuna are likely to pass. The trap is entered through an opening in the net that is nearest to the shore. Once inside, the tuna find themselves in an enclosure, the sides and floor of which are composed of very strong netting. As they instinctively turn to the left in search of an escape route, they find what appears to be an exit, but this only leads them into another net constructed on the same principle. The series of nets culminates in the camera della morte, "chamber of death." The "mattanza", the slaughter of the tuna, consists in the raising of this last net and the gaffing of the tuna by men stationed on four large barges that surround it.

About 100 men, divided equally among the four barges, are usually required for this last stage in the operation. The net is lifted gradually with even tension from each quarter until the tuna are brought to the surface. The net is then made fast, and the gaffing begins. The fish are quite large, averaging six feet in length, with some running as large as ten feet, and they create a considerable

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ABSTRACTER: Roy C. Stevens

DRYING OF SALTED STOCKFISH

TRAP NET FISHING FOR TUNA

2.19 (Cross Reference: 2.01) found. The bilgy odor is most likely to occur wherever the fish are jammed tightly against the pen boards. Fish separated from the boards by even small amounts of ice will not develop this particular type of spoilage. However, some fish that are not against the boards may also develop this odor. These are usually fish that are packed tightly together near the bottom of the pen. The weight of ice and fish from above forces these fish tightly together and brings about the necessary exclusion of air. Under these conditions, however, the odor does not develop as rapidly as where the fish are directly against the pen boards. If care is applied on deck to prevent the fish from being contaminated with their own feces, there will be even less chance for bilgy odors to develop in the fish in the hold. Dirty pen boards speed up the development of bilgy odors. Since these dirty and slimy surfaces usually contain many millions of spoilage bacteria, it does not take long for anaerobic decomposition to start when a fish is jammed tightly against a dirty pen board. While clean pen boards or non-corrosive non-absorbent metal walls and pen boards alone will not prevent the occurrence of bilgy fish, they will retard its development by one or two days. To prevent the development of bilgy fish every fisherman must realize that this problem is most likely to occur in the oldest fish. Therefore, he must take the greatest precautions with the fish caught first. The quantity of ice used on the floor of the pen should be sufficient to last until the fish are unloaded. Sufficient ice to keep the individual fish separated from each other also is important. But most important of all a wall of ice must be used between the fish and the sides of the pen. Of the three factors -- clean fish, sanitary pens, and the prevention of anaerobic conditions by keeping the fish away from flat surfaces -- the last is the most effective and the most easily carried out.	2.14 (Cross Reference: 1.1) furor with their flounderings. The men use iron or steel-tipped gaffs on long wooden poles to bring the fish to the side of the barge where other fishermen haul them over with short hand-spikes. Nearly all the tuna taken in Sicily is canned. A small percentage is sold fresh, but the high costs put it beyond the reach of the average household. The men working in the fishery are paid a small regular salary and a percentage on the catch.
	3.5 (Cross Reference: 7.81) Drying rates. The average moisture removal rate, for the six random check fish, during the first two hours of drying was 9% per hour of the total to be removed to reach the desired moisture content of 25%. The average moisture content of the six check fish after 4 days was 19.5% (max. 27.2%; min. 8.6%), and the moisture removal rate at this stage was 0.4%/hr. of the total to be removed. The average rate over 4 days was 1.15%/hr. Based on this experimental data a specification was evolved for an industrial scale drying plant in which a number of tunnels are fitted with thermostatically controlled heaters which are supplied with steam or hot water from a single boiler. Humidity control is effected by adjusting the quantity of air which is recirculated. The tunnels are loaded consecutively and thus, although each tunnel in itself is a single stage batch drier, a group of, say three tunnels can be operated as a three stage drier. <u>Estimation of Basic Volatile Nitrogen</u> The vacuum-distillation method of Tomiyama and Harada (Bull. Jap. Soc. Sci. Fish. 18 (3) 20 (1952)) for the estimation of total basic volatile nitrogen was applied to dried salt bake, and was found to give results comparable with those of the micro-diffusion method of Conway, but in very much shorter time than the latter. Estimations on a small number of commercially dried fish showed the total basic volatile nitrogen content to be on the average less than half of the maximum limit of 100 mgm./100 gm. allowed in certain markets.

SOME RECENT STUDIES ON THE AUTOXIDATION OF DRYING OILS

O'Neill, L. A.
Chemistry and Industry, No. 14, 384-387 (April 3, 1954)

Some industries, such as the food industry, are primarily concerned with the prevention of oil and fat oxidation and hence have studied mainly the initial stages of oxidation. For the paint, linoleum and printing ink industries, however, oxidation is a necessity and it would seem that the particular province of these industries should be the study of the later (and more complex) stages of oxidation which lead to the formation of polymers, the essential function of the oxidation process.

Investigations carried out at the Paint Research Station of the reactions involved have followed two main lines:

- (1) examination of particular reaction stages, using simplified starting materials such as the methyl esters of pure fatty acids, both non-conjugated and conjugated;
- (2) examination of the over-all reactions, using natural oils.

The general picture of the autoxidation of drying oils, from the results so far obtained appears to be as follows:

Non-conjugated fatty oils -- The initial reaction is a chain reaction at the active methylene groups to give hydroperoxides, and double bond rearrangement to a conjugated system. The termination steps of this chain reaction will lead to dimerization. Decomposition of the hydroperoxides will involve further dimerization and various substitutive side reactions. Autoxidation of the conjugated double bond systems developed will take place as for conjugated oils. Large amounts of

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0. 31 THE FUNGISTATIC ACTION OF SQUALENE ON CERTAIN DERMATOPHYTES IN VITRO

Sobel, Harry; Marmorston, Jessie; and Arzangoolian, Hilda (University of Southern California School of Medicine, Los Angeles)
Science 119, No. 3101, 816 (June 4, 1954)

Squalene, an unsaturated triterpenoid hydrocarbon, was originally isolated from shark oil in 1916. Squalene is also found in the fat from ovarian dermoid cysts and in normal human sebum.

The authors attempted to determine if squalene might exert a protective action on skin. This is possible because squalene, which has the consistency and appearance of mineral oil when pure, takes up oxygen rapidly on exposure to air and forms a viscous yellow oil with a high peroxide content.

Undiluted squalene was found to prevent the multiplication of *Microsporum mentagrophytes*, *Microsporum audouinii*, and *Microsporum tonsurans* on the surface of Sabouraud's agar. In some instances squalene also inhibited the growth of *Microsporum gypseum*. Squalene did not inhibit the multiplication of *Aspergillus terreus*.

Evidence is present which indicates that squalene exposed to air prior to use may be more effective as a growth inhibitor than pure squalene. This observation also suggests that squalene may be a protective agent for the skin. This communication is presented in the hope that it will stimulate the clinical investigation of squalene.

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ABSTRACTER: Martin Heerd

AUTOXIDATION OF DRYING OILS

FUNGISTATIC ACTION OF SQUALENE

THE BROWNING REACTION

Anonymous
Food Manufacture 19, No. 5, 173 (May, 1954)

The browning reaction is liable to occur whenever foods containing proteins or amino acids and reducing sugars are heated or are stored for long periods without refrigeration. This reaction may be beneficial or deleterious, depending on the food concerned. For example, the production of flavor, odor, and color in many baked and roasted products is desirable. In contrast, the production of stale and otherwise unpleasant tastes, the development of varying degrees of brown discoloration, the loss of protein solubility leading to a deterioration in texture and the failure of foods to reconstitute properly, and an increased tendency for liquid foods to froth and foam are deleterious. This reaction occurs in several stages. The first of these is a condensation between the amino group of the protein or amino acid and the reducing group of the sugar. The first reaction is not accompanied by a change in color. However, if the food is heated or stored, a secondary reaction occurs. This secondary reaction involves the breakdown of sugar molecules and results in the production of a brown discoloration, the depth of which varies with the amount of heating or the duration of storage.

The nutritional value of proteins has been seriously impaired by reaction with carbohydrates. Proteins involved appear to have been rendered less digestible because of protein-carbohydrate linkages not susceptible to enzymic hydrolysis. There is additional evidence which shows that several essential amino acids, and lysine in particular, are directly involved in the reaction. Losses in nutritive values of the proteins that have been heated with reducing sugars are reported to range between 10 and 100 percent.

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ABSTRACTER: Martin Heerd

0. 5 ADAPTATION OF THE "DROP PLATE" METHOD FOR THE ENUMERATION OF RED HALOPHILIC BACTERIA

Dussault, H. P. (Gaspé Fisheries Experimental Station, Grande-Rivière, P. Q.)
Journal of the Fisheries Research Board of Canada XL, No. 3, 261-266 (May, 1954)

The conventional methods for counting bacteria cannot be applied to red halophiles. The direct microscopical counting method does not differentiate viable from dead cells or chromogenic from nonchromogenic organisms. The ordinary "pour plate" method is also impractical, since the red halophiles are strict aerobes growing only on the surface of nutrient media. Because of these and other limitations, most studies have been limited to the determination of the presence or absence of red halophilic bacteria; the accuracy of increases or decreases in total numbers could not be properly evaluated.

The author has adapted the "drop plate" method (Reed and Reed, 1948) to the enumeration of red halophilic bacteria from contaminated salt and discolored salt fish. The plating procedure consists simply of adding, with a calibrated dropping pipette, drops of serially diluted suspensions of bacteria onto the surface of an appropriate agar medium. After proper incubation time, the bacteria present in each drop of suspension will develop into well-spaced surface colonies that can be rapidly and accurately counted.

The procedure used in plating is roughly as follows: Freshly poured and cooled plates containing 20 ml. of skim milk-salt agar are incubated about 30 minutes at 37°C. with lids partially off to dry droplets of water from the surface. Then, with a calibrated pipette, drops of the selected dilutions are placed on the surface. Usually six evenly spaced drops are used. When the drops have been absorbed by the agar the plates are inverted and incubated at 37°C.

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ABSTRACTER: Kathryn L. Osterhaug

BROWNING REACTION

COUNTING RED HALOPHILIC BACTERIA

0. 31 (Cross Reference: 0. 4)	0. 5 (Cross Reference: 3. 5) After the proper incubation time, individual colonies are easily spotted by their red color against the white background of the medium and are conveniently counted with the aid of a hand lens under good lighting. The total number of bacteria per ml. is calculated by multiplying the number of colonies per drop by the number of drops per ml., by the dilution factor. The total counts obtained experimentally show fair reliability and good reproducibility from random sampling. One disadvantage of the "drop plate" method is the long incubation period (14 days) required for obtaining complete total counts from samples of contaminated solar salts.
4. 21. oxygen will be taken up and much scission will occur. The range of molecular sizes will be very wide, bonding by secondary valence forces will be considerable, and a macromolecular network will be comparatively slow in developing. Conjugated fatty oils -- The main reactions are direct attack by oxygen at the double bond systems in the 1:4 or 1:2 positions with the competitive production of monomeric (predominant), dimeric and higher polymeric mainly carbon-carbon linked peroxides. A macromolecular network is soon built up but considerable scission occurs, particularly of the monomeric peroxides to give aldehydes.	

3. 19 PRESERVATION OF FOOD WITH IONIZING RADIATIONS Haman, R. S. Nature 173, No. 4408, 752-754 (April 24, 1954) Chemistry and Industry, No. 14, 390-395 (April 3, 1954) Powerful sources of ionizing radiations have become increasingly available during the past 10 years. The possibilities for the utilization of the lethal effects of these radiations for killing microorganisms in food are being investigated. If the primary cause of most types of spoilage could be affected without damaging the food, irradiation would represent a distinct advantage over existing methods of preservation. Suitable sources of ionizing radiations are (1) electrical generators delivering high-speed electrons or, less probably, x-rays and (2) radio-active sources giving electrons (β rays) or electromagnetic radiation (γ rays). A generator now available with an accelerating voltage of 3 million volts and delivering 4 kilowatts of electron beampower could sterilize samples, of unit density, about an inch thick (by irradiating from both sides) at a rate of about 1, 000 lbs. an hour. Thicker samples would require higher voltage but not to exceed 10 million volts (sample thickness of about three inches) if induced radioactivity in the food is to be avoided. The limited penetration of electrons is an obvious disadvantage for many applications. Consequently, the more penetrating γ rays would be preferred. These rays could be obtained from (1) the spent reactor rods in their initial cooling period and (2) the residues (fission products) which remain after chemical processing of the fuel rods. The primary biological effect of irradiation is a physical act of energy absorption which leads to the excitation and ionization of individual atoms. The biological damage which results is (1) a (over) COMMERCIAL FISHERIES ABSTRACTS VOL. VII NO. 8 PAGE 11 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Martin Heerdt	4. 99 USE AND VALUES OF FISH OIL IN POULTRY FEEDS DISCUSSED Sturgis, Howard O. (National Fisheries Institute, Washington, D. C.) Feedstuffs 26, No. 23, 12, 68 (June 5, 1954) Fish oils contain all the values available in inedible fats and greases and, in addition, are easier to handle. They do an even better job of improving palatability, color, and texture than inedible fats and greases. In some instances fish oils are carriers of vitamins and natural antioxidants. If properly stabilized, fish oils will improve the vitamin stability of the entire feed. They can be added readily by most feed manufacturers without a costly investment in equipment. If the export outlet for fish oils should become unfavorable, their domestic use as an energy factor in feeds might be a partial solution to the problem. For example, one-half of 1% of fish oil in 50% of the poultry feed manufactured would account for one million pounds of fish oil, or the equivalent of the 1953 exports. Adding as much as 2% fish oil is profitable because it improves the nutritive value, appearance, and texture of a poultry feed. Experiments show that the meat of birds receiving fish oil is excellent in flavor and appearance. Other tests have shown that there is no fish flavor in eggs laid by hens receiving fish oil in their laying ration. Fish oil for use in blending with poultry feeds must be made from the freshest possible raw material and not from partially decomposed materials. Edible grade, non-toxic antioxidants should be added as stabilizers. Feed manufacturers should be advised on the desirability of adding antioxidants to all feeds at the time of mixing as an additional means of preventing nutritional encephalomalacia. (over) COMMERCIAL FISHERIES ABSTRACTS VOL. VII NO. 8 PAGE 11 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Martin Heerdt
3. 33 SALT TABLETS PREVENT STRUVITE FORMATION Anonymous Food Engineering 26, No. 5, 115 (May, 1954) Of interest to canners is a recently perfected anti-struvite salt tablet. Struvites are more or less harmless crystals that are present in varying amounts in today's canned fish. They are tasteless, colorless, quite insoluble in water, but are dissolved by stomach acids. The crystals are stated to have several bad features -- they look like glass, could injure the mouth, and are gritty. Technically known as magnesium ammonium phosphate hexahydrate, they are formed in canned fish from three chemical radicals which occur naturally in fish and shell-fish. This formation takes place only after the seafood has been processed and may appear within a few weeks or months. The patented salt, which prevents formation of struvites, is now being made in correctly proportioned tablets of sodium hexametaphosphate and sodium chloride. The tablets may be deposited in food cans by machine or by hand. Reprinted in part COMMERCIAL FISHERIES ABSTRACTS VOL. VII NO. 8 PAGE 11 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE	3. 5 DESTRUCTION OF "RED HALOPHILES" BY ANTAGONISTIC BACTERIA Dussault, H. P. (Gaspé Fisheries Experimental Station, Grande Rivière, P. Q.) Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations, No. 58, 3-5 (April, 1954) Red halophilic bacteria continue to destroy large quantities of heavily salted fish because (1) they are extremely resistant to most of the common disinfectants and bactericides, (2) they are a common contaminant of solar salt, which the industry continues to use, and (3) they can be eliminated only by a conscientious application of the recommended remedies. In a further study of this problem, bacterial cultures obtained from heavily-salted fish from a particular locality were found to inhibit the growth of red halophiles. Ten types of organisms were isolated from these cultures. When tested singly on agar medium against a pure strain of <i>S. salinarum</i>, a pure strain of <i>S. littoralis</i>, and a mixture of the red halophiles in solar salt, they all produced clear and definite zones of growth inhibition (figure 1). Neither the growth-inhibiting organisms themselves nor their methods of attack have been determined. Experiments not yet completed, however, indicate that the isolated bacteria either directly destroy the red halophiles or they remove from the culture medium some substance essential to their survival or development. Fresh cod, cured in a brine solution made from solar salt heavily contaminated with red halophiles and seeded with a mixed culture composed of the ten organisms found to be antagonistic to red halophiles, was entirely free from red halophiles after 10 and 21 days of curing. The control (over) COMMERCIAL FISHERIES ABSTRACTS VOL. VII NO. 8 PAGE 11 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Martin Heerdt

IRRADIATION PRESERVATION OF FOODS

SALT TABLETS PREVENT STRUVITE

FISH OIL IN POULTRY FEEDS

DESTRUCTION OF RED HALOPHILES

3.5 (Cross Reference: 0.5)

cod, by contrast, showed heavy contamination. Cod cured in the presence of the mixed culture of bacteria antagonistic to red halophiles was of excellent quality both after drying and after a period of storage.

In another instance, a sample of fish contaminated with red halophiles was rendered halophile-free simply by dipping for 1 minute in a brine containing a heavy inoculum of the antagonistic bacteria and allowing the fish to dry.

The isolated cultures of antagonistic bacteria will be applied experimentally on a large scale during the forthcoming fishing season.



Fig. 1. Plates seeded with red halophilic bacteria, showing inhibition zones where the antagonistic organisms have been added to the surface of the agar medium.

3.19

loss of the ability of cell reproduction followed by cell death or (2) cell differentiation. It has been found that direct tests of metabolic activity such as respiration, glycolysis and adenosine triphosphate synthesis show little change even with quite high doses. More important enzyme systems are therefore not damaged; but metabolic steps are undoubtedly involved in the development of radio-biological damage. Microorganisms that are subjected to large doses of irradiation fail to multiply. This can be accounted for in terms of an ionization having occurred in a sensitive region of the cell. The lethal effect of a given dose can be modified by changes in the environment of the organism, such as the removal of oxygen, addition of protective compounds, removal of water, or changes in temperature. These effects indicate that the dose required to inactivate microorganisms in a food product will depend to some extent on the nature of the food and the method of processing.

Even the most resistant spores in broth suspension can be inactivated by doses of 2×10^6 r. e. p., i. e., the equivalent of a temperature rise of 4°C . Sterilization without heating is therefore possible and it is probable that doses up to 3×10^6 r. e. p. may eventually be found necessary. Lower dose levels will find practical use, however. About 5×10^5 r. e. p. delays the onset of microbial spoilage, and doses of 2.5×10^4 r. e. p. have been used to break the reproduction cycle of insects in foods.

Chemical damage to the food itself cannot be ignored, because prohibitive changes in color, odor, and flavor frequently occur. Chemical changes are the result of (1) indirect effects in the aqueous phase and (2) a complex series of effects in the lipids. The most obvious changes appear to be oxidative.

Most products of animal origin develop typical irradiation odors and flavors and require such protective techniques as de-aeration and deep freezing before irradiation for partial control. The enzymes in fruits and vegetables present difficulties in that they are not usually inactivated by irradiation. The possibility exists that harmful compounds might be formed as a result of irradiation. While this has not been demonstrated, considerable evidence will be required before it can be disregarded.

4.99

Fats have been demonstrated with remarkable consistency to be well assimilated by poultry and generally to improve feeding efficiency. Most poultry feeds today are designed to give rapid growth with the minimum of feed consumption. Therefore, it is essential that critical nutrients be supplied in adequate amounts. Since fats and oils generally improve feed efficiency, the total consumption of feed will be reduced. When oil is incorporated in poultry feeds it should be used as an additive rather than as a replacement for other ingredients.

0. 6 MODERN FOOD PROCESSING Sherman, Henry (Massachusetts Institute of Technology, Cambridge) Practical Home Economics XXXII, No. 9, 18-17, 28, 39, 45 (May, 1954) The most common preservative techniques of the early days included salting, pickling, smoking and drying. The products were usually different from the fresh foods and usually were inferior in quality. The modern producer has centered his attention on foods that are better in nutritional quality, flavor, color, and texture, and on foods of convenience. Dehydration, freezing, and canning are the chief methods of preserving foods today. Dehydration methods today include sun drying, drum drying, spray drying and "freeze drying." In drum drying, the material is placed on the outer surface of a revolving, internally-heated drum. When it is dry the material is scraped from the drum. In spray drying, the material is forced through a special nozzle as a mist into a heated chamber, and dried particles collect at the bottom of the chamber. The product from spray drying is of higher quality than that from drum drying as lower temperatures are involved in spray drying. High-vacuum techniques are involved in "freeze drying" or lyophilization. This technique has been most successful with liquids such as fruit juices, coffee, and whole eggs. The product is first frozen and then subjected to a high vacuum, during which time the ice that has formed sublimates. The changes in dehydration techniques have been due to the efforts being made to improve the quality of such products. For example, one of the major problems encountered with dehydrated eggs was that they turned brown during storage. Recent experiments have shown that if glucose is removed from the egg prior to drying by the use of the enzyme glucose oxidase the browning reaction does not occur. (over) COMMERCIAL FISHERIES ABSTRACTS VOL VII NO. 8 PAGE 13 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. ABSTRACTER: Kathryn L. Osterhaug	2. 3 NEW AUTOMATIC FISH SCALER Anonymous Fishing Gazette 71, No. 4, 47 (April, 1954) A new fish scaling machine has recently been developed by a Wakefield, Massachusetts inventor. Unique in many of its features, the unit is claimed to be capable of scaling about 2,000 scrod haddock in less than half an hour. Fish enter the machine head first and come out onto the belt in the same position. Each operation is equipped with three scaling devices that rotate at a speed of 2200 r.p.m. The feeders retard the speed of the fish so that it gives the scaler a chance to pull the scales off and the fish is then forced through by the speed of the scalers. Because there is no concentrated weight on the fish -- and this is one of the machine's outstanding features -- the fish remain intact and unbroken, neat and clean when they reach the conveyor belt that takes them to the filleting line. The machine is simple in design and open in construction, making it easy to keep clean and in sanitary condition. It is made of stainless steel and bronze and the motor is housed in a water-proof case. It has a vertical thrust driven by V-belts and stainless steel chains, and is self adjusting for different size fish. The patented unit will be made available on a monthly rental basis. (over) COMMERCIAL FISHERIES ABSTRACTS VOL VII NO. 8 PAGE 13 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. ABSTRACTER: Roy C. Stevens
4. 66 ANTIOXIDANTS AND ENZYMES. EFFECT OF ALPHA-TOCOPHEROL, PROPYL GALLATE, AND NORDIHYDROGUAIARETIC ACID ON ENZYMATIC REACTIONS Tappel, A. L. and Marr, A. G. (University of California, Davis, California) Journal of Agricultural and Food Chemistry 2, No. 11, 554-57 (May 26, 1954) Phenolic antioxidants find extensive use in the stabilization of edible foods containing fats. (Of the phenolic antioxidants approved for foods, butylated hydroxyanisole, propyl gallate, and nordihydroguaiaretic acid are used in the largest quantities.) In addition to stabilizing fats, these antioxidants may find use in inhibiting enzymatic deteriorative reactions in unblanched or uncooked foods, although this use has not as yet been given much study. The enzymes soybean lipoxidase, mushroom catecholase, and beef-liver catalase are inhibited by phenolic compounds. Thus, lipoxidase is strongly inhibited by propyl gallate and nordihydroguaiaretic acid. The inhibition of lipoxidase by nordihydroguaiaretic acid is due not only to interaction of nordihydroguaiaretic acid with a lipoxidase-lipoate complex in which nordihydroguaiaretic acid is preferentially oxidized, but also to the reversible inhibition of lipoxidase activity by a direct reaction of the antioxidant with the enzyme. Further knowledge of the effect of antioxidants on other enzymatic reactions should help to explain the mechanism by which phenolic compounds inhibit such reactions. An important biological function of vitamin E might be the inhibition of enzymic oxidations. Except for studies of the inhibition of succinoxidase by α-tocopherol phosphate, the inhibition of enzymes by α-tocopherol remains largely unexplored. (over) COMMERCIAL FISHERIES ABSTRACTS VOL VII NO. 8 PAGE 13 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. ABSTRACTER: F. Bruce Sanford	3. 19 TOKYO 'RADIATING' FISH Anonymous Food Engineering 26, No. 5, 207 (May, 1954) Employing cobalt-60 of 21-Curie strength, scientists of Tokyo Marine University are exploring possibilities of radiation sterilization of seafood. In experiments, sliced fish cakes first are wrapped in polyethylene, then with tinfoil, whereupon they are exposed to the gamma rays for 45 hr. at a distance of 15 cm. The foil provides a secondary radiation of beta rays supplementing the low cobalt radiation. So sterilized, the cakes have kept two weeks without refrigeration. Prof. Ikunosuke Okada, who is directing the work, foresees practical results using 1,000,000-Curie strength cobalt-60, which must be obtained from the U. S. Atomic Energy Commission. (over) COMMERCIAL FISHERIES ABSTRACTS VOL VII NO. 8 PAGE 13 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. ABSTRACTER: F. Bruce Sanford

The present paper reports the inhibition of 14 enzyme systems by the antioxidants α -tocopherol, propyl gallate, and nordihydroguaiaric acid. The purposes of the work were to determine if phenolic antioxidants would inhibit enzymic reactions typical of those that cause deterioration in refrigerated and frozen foods, to determine the inhibition of oxidative enzymes by α -tocopherol, and to add to knowledge of the enzyme inhibition by phenolic compounds.

The authors found that the antioxidants inhibited peroxidase, catalase, and ethyl alcohol dehydrogenase at low concentration. Because peroxidase can react with many easily oxidizable compounds, the three antioxidants probably compete with the substrate guaiacol. A similar explanation applies to the inhibition of catalase by propyl gallate and nordihydroguaiaric acid.

The inhibition of ethyl alcohol dehydrogenase by antioxidants is complex. Ionic impurities in distilled water cause an inactivation that is accelerated by antioxidants; yet antioxidants alone do not cause appreciable inactivation. The protection from inhibition by compounds that react with heavy metals suggests that heavy metals cause the inactivation *per se* and that antioxidants sensitize the enzyme to inactivation. The possible biological significance of the strong inhibition properties of α -tocopherol, which were noted in the present study, indicates that the mechanism of antioxidant inhibition of ethyl alcohol dehydrogenase should be studied further.

Among the enzymes studied, polyphenolase and succinoxidase were not inhibited by nordihydroguaiaric acid or propyl gallate at 2.7×10^{-3} M. Urease, on the other hand, is an example of an enzyme that can be readily inactivated by heavy metals, fluorides, halogens, borates, quinones, formaldehyde, hydrogen peroxide, and other compounds.

Although the use of cold for the preservation of food is age-old, it is only in comparatively recent times that great progress has been made in its technological application to food. The two most recent technological developments in the food freezing field are dehydro-freezing and the recovery of volatile oils during concentration. Dehydro-freezing is characterized by a high degree of retention of fresh product characteristics, ease of utilization, and decreased transportation and storage costs. It consists of preparing the food as for conventional freezing, inactivating the enzymes by blanching, reducing the weight and volume about 50 percent in an atmospheric dryer, packaging, and freezing.

The control of curdling in sauces by the use of rice flour and the control of rancidity by the use of antioxidants have helped solve some of the most pressing problems in the field of pre-cooked frozen foods, which continues to be a rapidly growing field.

The three most significant innovations in canning processes have been "high-temperature, short-time" or "flash" sterilization, aseptic canning and sealing, and agitated cooking.

Current laboratory research in the canning industry includes work on the possible uses of antibiotics in canning and on the use of high-frequency sound waves and beta and gamma rays for sterilizing foods.

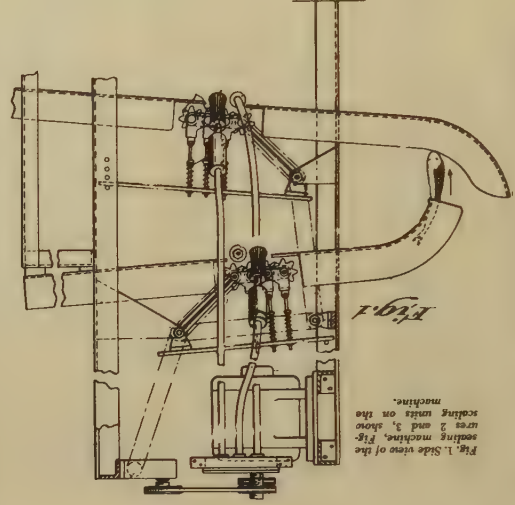
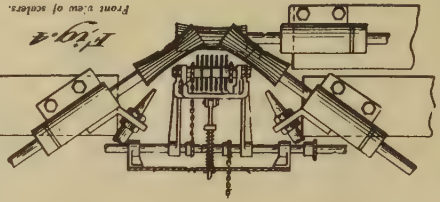


Fig. 1. Side view of the sealing machine. Figs. 2 and 3 show sealing units on the



Front view of rollers.



7. 51 ON THE FRACTIONATION OF THE PROTEINS OF EGG YOLK

Young, E. Gordon and Phimey, J. I. (Dalhousie University, Halifax, N. S.)
Journal of Biological Chemistry 193, No. 1, 73-80 (November, 1951)

Several methods have been used to fractionate the yolk proteins of the unfertilized eggs of the salmon (*Salmo salar*) and of the hen. Precipitation by dialysis was the most successful, if repeated three or four times, and yielded lipovitellin in a state of electrophoretic homogeneity.

Electrophoretic analysis revealed only three components, distributed in the proportions of 3, 6, 5, and 87.9 percent in salmon yolk, and 4, 6, 10, 2, and 85.1 percent in hen's egg yolk. Electrophoresis was carried out in a buffer solution containing sodium chloride and barbiturate at pH 8.5, ionic strength 0.32, and a field strength of 7 to 13 volts per cm.

Lipovitellin from salmon eggs has been found to contain 9 percent or less lipid, 14.1 percent nitrogen, and 2.1 percent phosphorus. Salmon vitellin contained 16.0 percent nitrogen and 1.0 percent phosphorus. An impure specimen of lipovitellin contained 14.9 percent nitrogen and 0.10 percent phosphorus. The isoelectric point of lipovitellin was found to be at pH 3.7 to 3.9 for the salmon, and at pH 3.4 to 3.5 for the hen. Lipovitellin appears to be readily denatured in contact with water at 20°.

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Author's summary

9. 2 RELATIVE PRODUCTIVITY AND VALUE OF THE FISHERIES OF THE UNITED STATES AND ALASKA, 1951

Finley, Bob
Commercial Fisheries Review 16, No. 4, 1-11 (April, 1954)

The fisheries of the world annually yield approximately 55 billion pounds. The United States and Alaska, in 1951, accounted for 9 percent of this total, ranking fourth in volume of production among the nations of the world.

The world catch of fish by the principal producing countries in order of volume is tabulated below.

Table III (this card, over)

is a partial reproduction of one listing in order of volume and of value, 50 of the more important species taken in the fisheries of the United States. Other topics discussed include: the leading fishing ports of the United States, the utilization of the catch, trends in production and landed value, and an analysis of the catch by areas and states. A total of ten tables and seven figures are presented.

Country	Quantity	Country	Quantity
Japan	8,370,205	Union of South Africa	771,610
China I.	8,600,000	Portugal	677,914
U. S. R.	5,511,500	Philippines	651,680
United States and Alaska	2,516,567	Denmark	644,525
Norway	2,039,756	Netherlands	617,286
United Kingdom	2,393,756	Sweden	440,920
Canada, Newfoundland, and Labrador	2,089,961	Italy	406,969
India	1,681,448	Malaya and Singapore	390,214
Western Germany	1,499,128	Cambodia	345,681
Spain	1,305,564	Southwest Africa	308,644
France	1,022,063	Other Countries	10,659,372
		Total	57,099,140

The reason for the difference in the amount shown in this table and the United States production reported elsewhere in this issue is that the United States statistics are based on the total catch of fish and shellfish, while the statistics in this table are based on the catch of fish and shellfish only. The United States statistics are based on the total catch of fish and shellfish, while the statistics in this table are based on the catch of fish and shellfish only. The United States statistics are based on the total catch of fish and shellfish, while the statistics in this table are based on the catch of fish and shellfish only.

Source: Yearbook of Fisheries Statistics 1952-53, Food and Agriculture Organization of the United Nations.

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ABSTRACTER: Roy C. Stevens

3. 4 SALMON -- FROM JARS TO WRAPPERS

Anonymous
Fishing Gazette 71, No. 4, 120 (April, 1954)

Sliced smoked salmon is now being introduced in self-service markets in piliofilm packages. Until now this delicatessen item has been sold either in jars, or across the counter after being sliced personally for each customer.

A Los Angeles smoked fish company recently concluded that even its smallest 8-ounce jar was too large a unit to appeal to many of the potential small-unit buyers. Accordingly, the company has come out with a 3/4-ounce package similar to that used for sliced bacon. Slices of the salmon are placed on a board that is then overwrapped with a piliofilm sheet. Wrapped in this manner, and when kept under refrigeration, the product has a shelf life of from three to four weeks without any apparent drying out or loss of weight.

The company's president states that results in local markets have been excellent, and that new outlets have been secured because of the new unit. He believes that this smaller package will be tried by persons who never before tried sliced smoked salmon, pointing out that a shopper will be willing to buy a small amount of a new food but is unwilling to buy a large amount. Freight costs have been cut considerably on long-distance shipments since the jars previously used were heavy as well as expensive.

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ABSTRACTER: Roy C. Stevens

4. 99 FEEDING MENHADEN OIL TO GROWING AND LAYING PULLETS

Nilson, Hugo (U. S. Fish and Wildlife Service, College Park, Maryland)
Fish Meal and Oil Industry Yearbook, 10-11 (April, 1954)

Recent interest in the addition of animal and vegetable fats and oils to feeds has been partially due to the relative abundance of fats and oils on the market, and also to the fact that their addition to feeds makes the feeds less dusty. The addition of fats and oils is also considered worthwhile from the standpoint of improved palatability.

In previous experiments it was shown that diets with up to eight percent added corn oil or menhaden body oil had no adverse effect on the health of broilers grown in battery cages. However, those birds fed diets with eight percent menhaden body oil ate less feed than those fed diets with eight percent corn oil, or diets with six percent or less of fish oils. The meat of the broilers fed diets with more than 1.5 percent of added fish oil were found to have an off or sometimes decidedly fishy flavor.

The present experiments were conducted to determine the effect of feeding menhaden body oil on egg laying and on the flavor of the eggs. A basic broiler diet consisting of ground yellow corn, 60.4; soybean meal, 22.0; fish meal, 5.0; meat meal, 6.0; alfalfa meal, 5.0; steamed bone meal, 1.0; manganized salt, 0.4; vitamin A and D feeding oil, 0.2; and riboflavin concentrate, 0.05 parts to equal 100 parts by weight was fed during most of the time. Menhaden body oil was included in the diets at levels of 0, 1, 2, and 8 percent at the expense of an equal weight of ground corn.

The results of the tests are summarized as follows:

(over)

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ABSTRACTER: Roy C. Stevens

FRACTIONATION OF EGG YOLK PROTEINS

U. S. FISHERY STATISTICS FOR 1951

PACKAGED SLICED SMOKED SALMON

MENHADEN OIL IN PULLET DIETS

Table 3 - Relative Quantity and Value of the Fisheries Production in the United States and Alaska by Species.

Rank		Species	Quantity	Percentage of Total for U.S. & Alaska	Catch	Percentage of Total for U.S. & Alaska	Value	Percentage of Total for U.S. & Alaska
				(Cumulative)		(Cumulative)		(Cumulative)
1	Menhaden	1,327,056	27.5	1	1,327,056	17.5	52,595	14.5
2	Salmon	374,225	8.5	2	51,882	14.4	47,987	13.3
3	Shrimp	34,000	34.0	3	31,882	28.9	29,710	26.2
4	Tuna	319,748	7.2	4	29,070	37.0	27,487	42.2
5	Ocean perch (Atl.)	289,320	5.9	5	13,253	3.7	12,893	57.5
6	Flounders	154,321	3.5	6	12,597	3.5	12,387	61.0
7	Herring, sea	154,103	3.5	7	11,968	3.3	11,719	67.5
8	Crab	130,076	2.7	8	5,768	2.7	5,489	67.5
9	Whiting	118,417	2.7	9	5,379	2.6	5,189	70.2
10	Flounders	89,838	2.0	10	8,324	2.3	8,169	72.8
11	Jack mackerel	59,591	1.4	11	6,886	1.9	6,711	77.1
12	Scallops	57,697	1.3	12	5,856	1.8	5,779	79.0
13	Cod	48,056	1.1	13	3,962	1.1	3,818	81.9
14	Halibut	43,395	1.0	14	3,554	1.0	3,412	85.9
15	Albacore	36,689	.8	15	2,803	.8	2,684	88.5
16	Clams	35,429	.8	16	2,418	.8	2,303	88.5
17	Crab (port)	27,741	.6	17	2,152	.6	2,037	88.5
18	Scup (port)	25,790	.6	18	2,106	.6	2,015	88.5
19	Carpet	22,053	.5	19	2,015	.6	1,919	88.2
20	Sea bass, black (Atl.)	22,717	.5	20	1,823	.5	1,759	87.4
21	Crab	19,746	.4	21	1,759	.5	1,684	87.4
22	Shrimp	18,711	.4	22	1,684	.4	1,607	87.4
23	Sea bass, white	17,891	.4	23	1,592	.4	1,516	87.4
24	Shrimp	13,072	.3	24	1,469	.4	1,392	87.4
25	Shrimp	12,239	.3	25	1,392	.4	1,315	87.4
26	Shrimp	10,829	.2	26	1,233	.3	1,156	87.4
27	Shrimp	10,929	.2	27	1,080	.3	1,002	87.4
28	Shrimp	9,721	.2	28	1,002	.3	924	87.4
29	Shrimp	8,495	.2	29	1,002	.3	924	87.4
30	Shrimp	8,495	.2	30	1,002	.3	924	87.4
31	Shrimp	8,495	.2	31	1,002	.3	924	87.4
32	Shrimp	8,495	.2	32	1,002	.3	924	87.4
33	Shrimp	8,495	.2	33	1,002	.3	924	87.4
34	Shrimp	8,495	.2	34	1,002	.3	924	87.4
35	Shrimp	8,495	.2	35	1,002	.3	924	87.4
36	Shrimp	8,495	.2	36	1,002	.3	924	87.4
37	Shrimp	8,495	.2	37	1,002	.3	924	87.4
38	Shrimp	8,495	.2	38	1,002	.3	924	87.4
39	Shrimp	8,495	.2	39	1,002	.3	924	87.4
40	Shrimp	8,495	.2	40	1,002	.3	924	87.4

* Data are for 1941, except for the Mississippi River, area data for 1940.

4.99 (Cross Reference: 4.82)

1. Feeding diets with one, two and eight percent of added menhaden body oil permitted satisfactory growth and health of pullets. No effort was made to use freshly prepared oils and no antioxidant was added to the oil.
2. Feeding diets with one and two percent of added menhaden body oil permitted normal laying of eggs which were satisfactory in color, flavor and size.
3. Feeding diets with eight percent of added menhaden body oil did not permit the pullets to lay until α -tocopherol was included in the diet. The eggs sometimes had an off flavor but were satisfactory in color and size.
4. No conclusion can be made as to whether α -tocopherol acts as a general antioxidant or as vitamin E, or whether the physiological action of the latter is antioxidant in nature.
5. Menhaden body oil had but little effect on the flavor of the eggs.
6. Menhaden body oil at levels of one and two percent in the diet produced off-flavored or fishy-flavored meat in two out of three pullets at each level. At a level of eight percent oil in the diet the meat of three pullets had a very fishy flavor.

3. 18 SILVER ELECTRODES FOR STERILIZING SEA-WATER Castell, C. H.; Ellis, D. G.; and Anderson, G. W. Journal of the Fisheries Research Board of Canada 7, No. 2, 55-61 (May, 1947) The authors investigated the efficiency of purifying sea water by means of silver ions in the presence of sodium chloride and other salts normally present in sea water. One investigation was carried out with commercial water-purifying equipment that consisted of 3 separate mechanisms combined into one unit: (1) silver ions produced by means of metallic silver electrodes; (2) aluminum electrodes producing a hydrated aluminum oxide flock; (3) a sand filter about 30 inches deep. Bacterial analyses were made on polluted sea water which was then treated with this water-purifying equipment. The reduction in bacterial counts of the treated sea water varied from 0 to 99.3 percent, with many counts showing a reduction above 95 percent. This reduction in bacterial counts may have been the result of either the filter or the silver ions, or a combination of the two. A further series of tests were made to determine the effect of the silver electrode on the bacteria. One 20-liter carboy was filled with tap water and another carboy was filled with 2.5 percent sodium chloride solution. Both were inoculated with a heavy suspension of <i>E. coli</i>. Each solution was then run through a small purifier equipped with a silver electrode. Results of the bacterial counts show that (1) in tap water the silver acts as a typical disinfectant; (2) with the 2.5 percent salt solution, the bacterial count had doubled at the end of an hour instead of decreasing, which indicates that sodium chloride interferes with the bactericidal action of the silver electrode on bacteria in water. Another series of experiments was made in which serial dilutions of silver nitrate in water were used in place of the silver electrode with (a) distilled water, (b) 2.5 percent saline solution, and (c) sea water. The concentration of silver ions added to each group ran from 10^{-1} to 10^{-9} grams per milliliter. Each sample was inoculated with 1 ml. of a suspension of <i>E. coli</i>. The results of the (over) COMMERCIAL FISHERIES ABSTRACTS VOL. VII NO. 8 PAGE 17 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. ABSTRACTER: D. T. Miyauchi	2. 01 GROWTH OF CLOSTRIDIUM IN SEAWEEDS AND MARINE FISH Castell, Charles H. Journal of the Fisheries Research Board of Canada 7, No. 2, 62-69 (May, 1947) A study was being made of the growth of <i>Clostridium</i> in fish and other marine products, and this is the first in a series of papers reporting the results. Seven common seaweeds from the coastal waters of Nova Scotia -- <i>Chorda flagelliformis</i>, <i>Chorda filum</i>, <i>Laminaria digitata</i>, <i>Laminaria agardhii</i>, <i>Laminaria longicirris</i>, <i>Ascophyllum nodosum</i>, and <i>Fucus vesiculosus</i> -- were dried, powdered, and prepared for growing bacteria. These algae did not support the growth of the proteolytic species of <i>Clostridium</i>, which are significant as far as fish spoilage is concerned, but did support the growth of certain saccharolytic species, especially <i>Cl. pasteurianum</i>. The next investigation was concerned with the growth of <i>Clostridium</i> in fish under anaerobic conditions. The results are summarized as follows: (1) Commercially prepared cans of sardines and mackerel were inoculated with 0.2 ml. of 48-hour broth culture and incubated at 37° C.; after the cans showed signs of swelling, the contents of the cans were examined for typical organisms. The results indicate that with sufficient inoculum and a partial vacuum many common species of <i>Clostridium</i> grow in mackerel and sardines, with the exception of (a) some of the true butyric-acid forming species, (b) <i>Cl. phenoides</i>, and (c) <i>Cl. difficile</i>. (2) One-pound cans of cod were inoculated from a series of dilutions made from a culture of <i>Cl. sporogenes</i>. It was found that <i>Cl. sporogenes</i> would grow in canned codfish from relatively small inoculations but that growth was retarded 4 to 5 days when compared with growth from similar inocula in Brewer's medium. (3) The proteolytic and "stinker" types of <i>Clostridium</i> under anaerobic conditions grew well from small inocula in cod. (over) COMMERCIAL FISHERIES ABSTRACTS VOL. VII NO. 8 PAGE 17 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. ABSTRACTER: D. T. Miyauchi
4. 21 FISH OILS. V. THE EFFECT OF VARIOUS TREATMENTS ON THE RATE OF OXIDATION OF PILCHARD OIL Denstedt, O. F. and Brocklesby, H. N. Journal of the Biological Board of Canada 1, No. 6, 487-496 (September-December, 1935) Pilchard oil has a shorter inductive period and a greater rate of oxidation than other drying oils. Polymerization by heat prolongs the inductive period and diminishes the rate of oxidation whilst polymerization by ultra-violet radiation shortens the inductive period, increases the rate of oxidation and reduces the total amount of oxygen absorbed. Refining increases the susceptibility of the oil to oxidation. Treatment with dry sulphur dioxide eliminates the inductive period. Oxygen-absorption curves obtained by a manometric method are submitted to show the influence of driers, mineral pigments and anti-oxidants, on the rate of oxidation of the oil. (over) COMMERCIAL FISHERIES ABSTRACTS VOL. VII NO. 8 PAGE 17 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. ABSTRACTER: D. T. Miyauchi	7. 89 COLORIMETRIC NITRITE DETERMINATION Dyer, W. J. (Atlantic Fisheries Experimental Station, Halifax, N. S.) Journal of the Fisheries Research Board of Canada 6, No. 6, 414-418 (March, 1946) A simple, accurate procedure for the colorimetric determination of nitrite has been developed. The reagents used are: (a) 0.2 grams of p-aminobenzene sulphonylamide dissolved in 20 ml. of concentrated HCl and 80 ml. of water. (b) 0.02 grams of N-(1-naphthyl) ethylenediamine dihydrochloride dissolved in 100 ml. of water and stored in a dark bottle, preferably in a refrigerator. The author outlined the following procedure: "For 10 ml. final volume as used in the photo-electric colorimeter, dilute 0.5 ml. tissue extract or an aliquot of sample solution containing 0.0002 to 0.005 mg. sodium nitrite (0.00005-0.001 mg. nitrite nitrogen) to 10.0 ml. in a colorimeter tube. The sample solution should be neutral or slightly acid. Add 1 ml. sulphanilamide reagent and mix thoroughly. Follow by 1 ml. coupling reagent and again mix thoroughly. The red colour is measured in a photoelectric colorimeter using a filter with maximum transmission at 5400 A.U. A 5200 filter may be used satisfactorily but the absorption is not then at a maximum (figure 1, omitted). Brattan and Marshall also found the absorption maximum of the red complex at 5450 A.U. Maximum colour development takes place in five minutes and the colour is stable for two to three hours with very little fading during 24 hours. For reading, the colorimeter is set at 100 with a blank in which 1 ml. of water has been substituted for the sulphanilamide reagent. For standardization of the colorimeter, a sodium nitrite solution is prepared from silver nitrite (A.O.A.C. 1940, p. 527) and a standard curve prepared by using various dilutions (figure 1, omitted). More conveniently the constant K may be computed. K was found to be 1.39 (40.002) where K equals 2-log galvanometer reading divided by the concentration (over) COMMERCIAL FISHERIES ABSTRACTS VOL. VII NO. 8 PAGE 17 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. ABSTRACTER: D. T. Miyauchi
SILVER IONS IN SEA WATER PURIFICATION OXIDATION OF PILCHARD OIL Author's abstract COMMERCIAL FISHERIES ABSTRACTS VOL. VII NO. 8 PAGE 17 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE.	GROWTH OF CLOSTRIDIUM IN FISH COLORIMETRIC NITRITE DETERMINATION

4. 21 (Cross References: 4. 62, 6. 133)

7. 89 (Cross Reference: 3. 12)

of nitrite expressed as parts per million (p. p. m.) sodium nitrite in the 10 ml. volume. Beer's law is applicable over the range given. If only a few determinations are to be made, the colour given by 10 ml. of a standard solution containing 0. 20 p. p. m. sodium nitrite is measured, and the concentration in the unknown sample is then

$$\frac{2 - \log G \text{ of sample}}{2 - \log G \text{ of standard}} \times 0. 20 \text{ p. p. m. sodium nitrite}$$

If the extraction method given below is used (10 g. fish diluted to 500 ml.) and 0. 5 ml. extract is used per tube, the factor 200 instead of 0. 20 should be used in the above equation.

Since the A. O. A. C. method (1940, p. 378) for the extraction of nitrites is long and cumbersome for routine work, the extraction of some fish samples with water in an electric blender was tried. The results of the various methods of extraction are given in table I (omitted). They are in good agreement except method C, in which case froth was produced during blending and prevented the subsequent dilution to volume accurately.

In another experiment, the equivalent of 250 p. p. m. sodium nitrite was added to weighed samples of cod filets. The filets with and without sodium nitrite added were extracted by the 3 methods listed below, and quantitative recovery of the added nitrite was obtained with all 3 procedures.

Method of Extraction

- (A) 10 g. of fish extracted by A. O. A. C. procedure
(B) 10 g. of fish diluted to 500 ml. with water and blended
(C) 20 g. of fish diluted to 500 ml. with water and blended

Sodium Nitrite Recovered

101 %
100 %
98 %

3. 18.

bacteria counts (table III) show that with the lower concentration of silver the sodium chloride did interfere with its toxic action. With concentration of silver ions of 10⁻⁵ grams per ml. of more, however, the salt apparently did not interfere with the action of the silver. It appears that silver chloride above a certain concentration may have a bacteriostatic action; it may act as a reservoir for replacing silver ions as they are taken up by the bacteria until ultimately the organisms are destroyed.

The authors conclude that there is nothing in either the experimental evidence or from theoretical considerations to indicate that silver ions will be produced in large enough quantities in sea water from silver electrodes to have any effect on the reduction of bacteria.

Table III. The effect of various concentrations of silver ions on the survival of bacteria when added to suspensions of organisms in distilled water, 2. 5 percent saline solution and sea-water with a 10-minute contact period.

Added silver ions (g. per ml.)	Bacterial count per ml.		
	Distilled water	Saline solution	Sea-water
10 ⁻⁴	0*	0	0
10 ⁻⁵	0	0	87
10 ⁻⁶	0	0	119
10 ⁻⁷	0	30	++
10 ⁻⁸	0	++	++
10 ⁻⁹	4	++	++
	560	610	++
Controls	3700	4100	3800
		5200	4300

* Results from duplicate counts.

++ = too many colonies present to be counted on the plates poured from the 1 or 0. 1 ml. dilutions.

2. 01

hake, pollack, skate, lobster, and fish meal, and could initiate growth from inoculations as small as those required in Brewer's medium or in liver, although the growth occurred in fish materials from several days to a week later than in Brewer's medium. The saccharolytic type (butyricum and pasteurianum), however, grew poorly or not at all in the fish media. (4) In studies to determine the effect of reduced temperatures, ground cod filets and ground lobster meat were inoculated with 10 cultures of Clostridium and incubated at 25° and at 3° C. At 25° all samples showed indications of growth at 12 days, whereas at 3° C. none of the cultures showed characteristic changes after 3 months. The authors believe that the low temperature at which fresh fish is held is one factor which reduces the incidence of organisms in the genus.

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LIST OF PUBLICATIONS REGULARLY ABSTRACTED

Analyst	Food Technology
Analytical Chemistry	Foreign Commerce Weekly
Archives of Biochemistry and Biophysics	Frosted Food Field
Atlantic Fisherman	Industrial and Engineering Chemistry
Australian Journal of Marine and Freshwater Research	Industrial Refrigeration
Biochemical Journal	Journal of Agricultural and Food Chemistry
Bulletin of the Faculty of Fisheries, Hokkaido University	Journal of Applied Chemistry
Bulletin of the Japanese Society of Scientific Fisheries	Journal of Biological Chemistry
California Fish and Game	Journal of Home Economics
Canadian Fisherman	Journal of Nutrition
Canadian Journal of Chemistry	Journal of the American Chemical Society
Canadian Journal of Technology	Journal of the American Dietetic Association
Canner	Journal of the American Oil Chemists' Society
Chemical Abstracts	Journal of the Association of Official Agricultural Chemists
Chemical and Engineering News	Journal of the Fisheries Research Board of Canada
Chemical Engineering	Journal of the Science of Food and Agriculture
Chemistry and Industry	Maine Coast Fisherman
Commercial Fisheries Review	Meldinger Fra SSF (Herring Industry, Norway)
Commercial Fisherman	Modern Packaging
Drug and Cosmetic Industry	Modern Refrigeration
FAO Fisheries Bulletin	National Provisioner
Federation Proceedings	Nature
Feedstuffs	Nutrition Reviews
Fisheries Newsletter (Australia)	Pacific Fisherman
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Fish. Res. Bd. Canl., Prog. Repts. Pacific Coast Stas.	Poultry Science
Fisherman	Practical Home Economics
Fishermen's News	Progressive Fish-Culturist
Fishing Gazette	Quick Frozen Foods
Flour and Feed	Refrigerating Engineering
Food Engineering	Report of the Food Investigation Board (Great Britain)
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Food Packer	Southern Fisherman
Food Preservation Quarterly	Trade News (Fisheries Department, Canada)
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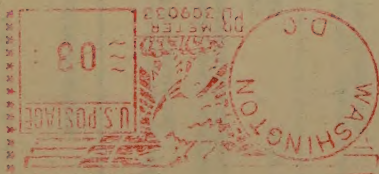
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8.59	STUDIES ON UTILIZATION OF THE LIVER OIL OF DEEP SEA SHARKS. VI. HYDROCARBON CONTENT IN THE LIVER OIL OF THE "AIZAME", <u>CENTROPHORUS</u> SPP. Higashi, Hideo; Kaneko, Tokugoro; and Sugii, Kisaburo Bulletin of the Japanese Society of Scientific Fisheries 19, No. 7, 861-67 (November, 1953) (English summary, tables, and figures)	9.15	INDUSTRIAL WASTES Murdock, Harold R. Industrial and Engineering Chemistry 45, No. 12, 99A (December, 1953)
8.59	STUDIES ON UTILIZATION OF THE LIVER OIL OF DEEP SEA SHARKS. IV. HYDROCARBON CONTENTS IN "YUMEZAME", <u>CENTROSCYMUS</u> <u>OWSTONI</u> GARMAN Higashi, Hideo; Kaneko, Tokugoro; Sugii, Kisaburo Bulletin of the Japanese Society of Scientific Fisheries 19, No. 7, 861-67 (November, 1953) (English summary, figures and tables)	9.15	EFFECTS OF OIL POLLUTION ON MARINE ORGANISMS Anonymous Commercial Fisheries Review 16, No. 4, 22-23 (April, 1954)
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8.6170	CONTENT OF VITAMIN A_2 IN SOME NILE FISHES Abdullah, M. M.; Morcos, S. R.; and Salah, M. K. Biochemical Journal 56, No. 4, 569-571 (April, 1954) The vitamin-A ₁ and -A ₂ contents of the livers of a number of species of Nile fishes have been determined. The presence of neovitamin A ₂ has been demonstrated.	9.2	FINANCING FISHING BOATS Symposium Southern Fisherman XIV, No. 1, 18-21 (January, 1954) I. The Banker's Viewpoint Fabion, John J., Jr. (First State Bank, Port Lavaca, Texas) II. The Financial Institution Murphy, R. S. (CIT Corporation, New York, N.Y.) III. Packaged Shrimp Trawlers Aberly, W. F. (Gibbs Corporation, Jacksonville, Florida) The above articles contain the complete text of three of the papers presented at the Economic Session of the Gulf and Caribbean Fisheries Institute at Miami in November, 1953.
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